



west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2561J
Plant ID No.:	039-00102
Applicant:	Bayer MaterialScience LLC
Facility Name:	South Charleston Facility
Location:	Kanawha County
NAICS Code:	325199
Application Type:	Modification
Received Date:	July 9, 2014
Engineer Assigned:	Steven R. Pursley, PE
Fee Amount:	\$3,500.00
Date Received:	July 14, 2014
Complete Date:	August 8, 2014
Due Date:	November 6, 2014
Applicant Ad Date:	July 2, 2014
Newspaper:	<i>The Charleston Gazette</i>
UTM's:	Easting: 439.650 km Northing: 4,247.000 km Zone: 17
Description:	Installation of an ethylene oxide storage tank, railcar unloading facilities and associated equipment.

DESCRIPTION OF PROCESS

Ethylene oxide (EO) is one of the primary raw materials that Bayer Material Science uses in its South Charleston manufacturing facility. EO is currently supplied to the facility by pipeline by a third party. Bayer is proposing to install an EO storage tank, railcar unloading equipment and associated equipment to supply EO to its Polyether Polyol manufacturing unit. After installation of the EO storage tank, Bayer will no longer receive EO by pipeline.

Supplier railcars of EO will be unloaded to a dedicated storage tank located on Blaine Island. Upon completion of unloading each railcar, liquid EO that remains in the unload strainer and piping will be purged back to the railcar or storage tank with nitrogen for approximately 45 minutes and vented to a scrubber to remove any residual EO. The

purging of the strainer and unload piping is the only routine point source air emission generated from the proposed EO storage system. The railcar and the storage tank are vapor balanced during the unloading process and no air emissions other than fugitives are generated. The EO from the storage tank is transferred to the B103 Process Manufacturing Polyether Polyol Unit (PMPU) and the B196 PMPU by pipeline for use in the Polyether Polyol reactors as required. EO in the storage tank will be cooled to 50°F utilizing a recirculation loop and refrigeration machine.

SITE INSPECTION

The facility is an existing, well known facility to WVDAQ. Therefore, no site inspection was deemed necessary. The last full, on-site inspection of the facility was performed on September 24, 2013 by Todd Shrewsbury of DAQs Enforcement Section. The facility was found to be in compliance.

To get to the facility take I-64 west to exit 56. At the end of the off ramp turn right on Montrose Drive. Go approximately 0.2 miles. At the intersection of Montrose Drive and MacCorkle Avenue the facility is directly across the street.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Emissions from the modification consist of:

1. EO emitted as a result of nitrogen purging of the system (emissions vented through the scrubber).

Uncontrolled emissions from nitrogen purging of the system were based on a material balance performed by the applicant. Controlled emissions were based on a scrubber designed to control 98% of EO emissions. Annual emissions from the scrubber are based on a yearly EO throughput of 7,389,474 gallons per year.

2. Fugitive emissions of EO.

The applicant hasn't finished final designs for the storage tank and piping and therefore doesn't have a component count. Therefore, they based their calculations on the existing EO delivery system and added 5%.

3. VOC emissions from the chiller tank.

The chiller tank contains a solution of propylene glycol (30%-40%) and water. Since the tank is so small (640 gallons) and is maintained at a constant temperature of between 0°C and 5°C the applicant believes the TANKS program is not appropriate to use. Therefore, they simply estimated emissions.

Controlled emissions from the facility will be as follows:

Emission Point	VOCs		Ethylene Oxide	
	lb/hr	tpy	lb/hr	tpy
E-7101 (Scrubber)	--	--	0.44	0.14
E7203 (Chiller Tank)	0.02	0.05	--	--
Fugitives	--	--	0.02	0.05
Total	0.02	0.05	0.46	0.19

REGULATORY APPLICABILITY

The following state and federal rules apply to the subject modification:

STATE RULES

45CSR13: Permits for Construction, Modification, Relocation and Operation of Stationary Sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The modification of the South Charleston Facility is subject to 45CSR13 because it “Results in an increase in emissions of an air pollutant listed in Table 45-13A of 10 percent or more of the amount set forth in Table 45-13A at a facility which, prior to the physical change or change in method of operation, has the potential to emit the air pollutant at or above the amount set forth in Table 45-13A...” Specifically, Table 45-13A lists Ethylene Oxide and has a trigger amount of 500 pounds per year. This modification has the potential to emit more than 10% of this amount and, therefore, Bayer is required to obtain a permit under 45CSR13 for the modification of the facility.

As required under §45-13-8.3 (“Notice Level A”), Bayer placed a Class I legal advertisement in a “newspaper of general circulation in the area where the source is . . . located.” The ad ran on July 2, 2014 in the *Charleston Gazette* and the affidavit of publication for this legal advertisement was submitted with the application on July 9, 2014.

45CSR27: To Prevent and Control the Emissions of Toxic Air Pollutants.

45CSR27 requires the installation of Best Available Technology (BAT) when a facility emits more than 500 pounds per year of EO. However, §45-27-3.1 provides that “any source or equipment specifically subject to a federal regulation or standard shall not be required to comply with provisions more stringent than such regulation or standard.” Since the South Charleston facility is subject to 40 CFR 63 Subpart PPP, compliance with that requirement will constitute compliance with 45CSR27.

45CSR30 Requirements for Operating Permits

The facility is an existing major source under 45CSR30 with an existing Title V permit. Changes authorized by the permit must also be incorporated into the facility’s Title V operating permit.

45CSR34: Emissions Standards for Hazardous Air Pollutants Pursuant to 40 CFR Part 63.

The facility is subject to the provisions of 45CSR34 because it is subject to 40 CFR 63 subpart PPP.

FEDERAL RULES:

40 CFR 63 Subpart PPP: National Emission Standards for Hazardous Air Pollutant Emissions for Polyether Polyols Production

The Polyether Polyol manufacturing units (PMPUs) were constructed prior to September 4, 1997. Additionally, Bayer reported in the application that the calculated fixed capital cost of the modification is 20% of a comparable new facility (less than the 50% “reconstruction” threshold). Therefore, the units remain subject to the existing source standards and not the new source standards.

The main requirement of Subpart PPP applicable to the modification are the process vent control requirements which apply to the vents controlled by the scrubber. §63.1425 requires existing affected sources to reduce EO emissions in one of four ways. Bayer has chosen to comply with the requirement to “reduce total epoxide emissions from the group of applicable process vents by an aggregated 98%” (§63.1425(b)(2)(ii)). §63.1426 requires Bayer to conduct a performance test of the scrubber to ensure compliance with the 98% reduction requirement. §63.1429 also requires that Bayer monitor the flow rate and pH of the scrubbing liquid.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

This section provides an analysis for those regulated pollutants that may be emitted as a result of the modification and that are not classified as “criteria pollutants.” Criteria pollutants are defined as Carbon Monoxide (CO), Lead (Pb), Oxides of Nitrogen (NO_x), Ozone, Particulate Matter (PM), Particulate Matter less than 10 microns (PM₁₀), Particulate Matter less than 2.5 microns (PM_{2.5}), and Sulfur Dioxide (SO₂). These pollutants have National Ambient Air Quality Standards (NAAQS) set for each that are designed to protect the public health and welfare. Other pollutants of concern, although designated as non-criteria and without national concentration standards, are regulated through various federal programs designed to limit their emissions and public exposure. These programs include federal source-specific Hazardous Air Pollutants (HAPs) standards promulgated under 40 CFR 61 (NESHAPS) and 40 CFR 63 (MACT). Any potential applicability to these programs were discussed above under REGULATORY APPLICABILITY.

The majority of non-criteria regulated pollutants fall under the definition of HAPs which, with some revision since, were 188 compounds identified under Section 112(b) of the Clean Air Act (CAA) as pollutants or groups of pollutants that EPA knows or suspects may cause cancer or other serious human health effects. Ethylene Oxide is the only HAP that will be emitted due to this modification. The following information comes directly from EPA's Air Toxics website:

“The major use for ethylene oxide is as a chemical intermediate in industry. The acute (short-term) effects of ethylene oxide in humans consist mainly of central nervous system (CNS) depression and irritation of the eyes and mucous membranes. Chronic (long-term) exposure to ethylene oxide in humans can cause irritation of the eyes, skin, and mucous membranes, and problems in the functioning of the brain and nerves. Some human cancer data show an increase in the incidence of leukemia, stomach cancer, cancer of the pancreas, and Hodgkin's disease in workers exposed to ethylene oxide. However these data are considered to be limited and inconclusive due to uncertainties in the studies. EPA has classified ethylene oxide as a Group B1, probable human carcinogen.”

AIR QUALITY IMPACT ANALYSIS

Since this is a minor modification to an existing major source, no modeling was performed.

MONITORING OF OPERATIONS

In addition to the monitoring required by 40 CFR 63 Subpart PPP, already discussed under Regulatory Applicability, the permit will require Bayer to monitor and record the following:

- * The amount of EO delivered to the EO storage tank C-7000.

CHANGES TO PERMIT R13-2561I

The following changes were made to R13-2561I

- * The new equipment was added to Table 1.0
- * Tank T-276 was removed from Table 6.1.1 since it is no longer in PMPO service
- * Table 11.1.1 was updated to include the point source emissions of EO. Fugitive emissions were not added because the applicant estimated that they would be the same as current fugitive emissions. Similarly, the emission limit in 11.1.2 was updated
- * Section 12 was added.

RECOMMENDATION TO DIRECTOR

Information supplied in the application indicates that compliance with all applicable regulations will be achieved. Therefore it is the recommendation of the writer that permit R13-2561J for the modification of a chemical processing facility in South Charleston, Kanawha County, be granted to Bayer MaterialScience LLC.

Steven R. Pursley, PE
Engineer

August 4, 2014

Fact Sheet R13-2561J
Bayer MaterialScience LLC
South Charleston Facility